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## RECORDS OF ALBERTA SPHECOIDEA WITH DESCRIPTIONS OF NEW SPECIES OF CRABRONIDAE.\*

BY WALTER CARTER,  
University of Minnesota.

The following species are contained in a collection of Sphecoidea taken in Alberta during the summer of 1923. The writer is indebted to Mr. Clarence E. Mickel and Dr. S. A. Rohwer for assistance in the determination of doubtful specimens.

### NYSSONINAE.

*Hoplisus elegantulus* Smith. One female, Edmonton, July 1, (E. H. Strickland). The female is not as yet described but there is no doubt as to the identity of this specimen.

*Hoplisoides ? spilopectus* Handlirsch. Lethbridge, August 5, (H. E. Gray).

### OXYBELINAE.

*Oxybelus quadrinotatus* Say. Both sexes, Coaldale, Lethbridge, Raymond, and Bow Island, June 23 to July 12, (H. L. Seamans and Walter Carter).

*Oxybelus albosignatus* H. S. Smith. One male, Lethbridge, August 7, (Walter Carter). Referred to this species though this sex has not yet been described.

*Notoglossa emarginata* Say. Males, Lethbridge, Bow Island and Taber, June 23 and 30, (H. E. Gray and Walter Carter); one female, Lethbridge, July 26.

*Belomicrus forbesii* Robertson. One male, Cypress Hills, July 23, (E. H. Strickland).

### CRABRONINAE.

*Crabro latipes* H. Smith. Males, Lethbridge, June 8, (H. L. Seamans); June 13 and 23, (Walter Carter); Raymond, June 6 and 15, (H. L. Seamans); Waterton, July 13, (H. L. Seamans); Coaldale, July 2, (Walter Carter); Elk Island, August 12, (E. H. Strickland); Edmonton, August 5, (E. H. Strickland); Chin, June 29, (H. E. Gray).

*Crabro florissantensis* Rohwer. One male, Waterton, July 10, (H. L. Seamans).

*Crabro tenuis*. Males, Waterton, June 19, July 9 and 11, (E. H. Strickland).

*Crabro montanus*. One male, one female, Edmonton, July 1, (E. H. Strickland).

*Crabro planipes* Fox. Males, Lethbridge, June 13 and 26, (Walter Carter); one female, Raymond, July 6, (H. L. Seamans). The female is doubtfully referred to this species.

*Crabro ater* Cresson. One female, Waterton, July 13, (E. H. Strickland).

*Xestocrabro trifasciatus* Say. One male, Edmonton, July 1, (E. H. Strick-

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land). Determination by Rohwer.

*Xestocrabro drymocallidis* Rohwer. Two males, Edmonton, June 30 and July 1, (E. H. Strickland). Determination by Rohwer.

*Lindenius errans* Fox. Females, Taber, June 30, (H. E. Gray); Cassils, July 26, (Walter Carter). The latter was collected from alfalfa blossoms.

*Solenius dilectus* Cresson. Both sexes, Lethbridge, June 19 to August 7, (H. L. Seamans and Walter Carter); male, Lake Newell (near Brooks), June 9; females, Purple Springs, August 25, (Walter Carter); Tofield, August 25, (E. H. Strickland); male, Milk River, (H. L. Seamans); female, Cassils, July 29, (Walter Carter).

*Solenius rufifemur* Packard. Two males, Lethbridge, June 23, (Walter Carter); July 25, (H. E. Gray).

*Solenius sayi* Cockerell. Both sexes, Elk Island, August 12, (E. H. Strickland); females, Waterton, July 18, (H. L. Seamans); July 22, (E. H. Strickland).

*Solenius corrugatus*. One female, Tofield, August 25, (E. H. Strickland). Doubtfully referred here.

*Solenius chrysarginus* LePeletier. One male, Edmonton, July 1, (E. H. Strickland).

#### CHLORIONINAE

*Chlorion bifoveolatum* Fabr. Males, Cypress Hills, July 28, (E. H. Strickland); Lethbridge, August 6, (H. L. Seamans).

*Chlorion atratum* LePeletier. One male, Purple Springs, August 15, (Walter Carter).

#### SPHECINAE

*Psammophila grossa* Cresson. Two females, Waterton, July 10, (E. H. Strickland and H. L. Seamans); One male, Waterton, July 13, (H. L. Seamans) one female, Waterton, July 13, (E. H. Strickland); one female, Lethbridge, August 7, (Walter Carter); one female, August 16, (H. L. Seamans).

*Psammophila violaceipennis* LePeletier. All males, Bow Slope, June 9, (Walter Carter), Brooks, July 27, (H. L. Seamans), July 9, (Walter Carter); August 7, (H. L. Seamans).

*Psammophila valida* Cresson. Males, Lethbridge, August 6 to 17, (H. L. Seamans and Walter Carter); Brooks, July 27; females, Brooks, July 27, (H. L. Seamans); Lethbridge, August 6, (H. E. Gray).

*Psammophila luctuosa* Smith. Two females, Calgary, July 18 and 19, 1922; female, Cypress Hills, July 28, (E. H. Strickland); a series of both sexes, Lethbridge, April 25 to August 21, (E. H. Strickland, H. E. Gray, H. L. Seamans, and Walter Carter); two females, Brooks, May 20 and June 6, (Walter Carter); male, Stirling, June 21, (H. L. Seamans); male, Milk River, July 3, (H. L. Seamans); two females, Waterton, July 1 and 9, (Walter Carter). This species is common in the early spring and summer.

A fair series of *Sphex* species was taken but satisfactory determinations cannot be made from the existing keys.

#### PEMPHREDONINAE

*Pemphredon rileyi* Fox. Waterton, July 12, (E. H. Strickland). A single specimen doubtfully referred to this species.

*Xylocelia adamsi* Titus. Female, Waterton, July 10, (H. L. Seamans).

*Xylocelia siouxensis* Mickel. Females, Milk River, July 3, (H. L. Seamans); Stirling, June 21, (H. L. Seamans). The following females were all collected off alfalfa blossoms: Lethbridge, July 11, (Walter Carter); Lethbridge, July 12, (Walter Carter); Cassils, July 26, (Walter Carter); Duchess, July 27, (Walter Carter).

## ASTATINAE

*Astata nubeculus* Cresson. One male, Lethbridge, July 11, (E. H. Strickland).

## LARRINAE

*Tachytes pepticus* Say. One male, Lethbridge, August 16, (H. L. Seamans).

*Tachysphex punctifrons* Fox. One female, Chin, June 29, (H. E. Gray).

*Tachysphex tenuipunctus* Fox. One female, Lethbridge, July 5, (H. E. Gray). Determination by Rohwer.

*Tachysphex zimmeri* Mickel. One female, Lethbridge, August 22, (Walter Carter).

*Tachysphex granulosus* Mickel. All females, Lethbridge, June 26, (Walter Carter); Tofield, August 25, (E. H. Strickland); Stirling, June 25, (H. L. Seamans); Raymond, July 6, (H. L. Seamans).

## CERCERIDAE

*Eucerceris superba* Cresson. 21 males, Lethbridge, August 6, 7 and 16, (H. L. Seamans, H. E. Gray and Walter Carter).

*Eucerceris bicolor* Cresson. Females, Lethbridge, August 5, 6 and 7, (H. L. Seamans and H. E. Gray).

*Cerceris nigrescens* F. Smith. Edmonton, June 30, (E. H. Strickland); Tofield, August 25, (E. H. Strickland); Taber, June 30, (H. E. Gray); Lethbridge, July 7, (H. E. Gray).

*Cerceris occiputomaculata* Packard. Females, Lethbridge, August 5, (H. E. Gray); Brooks, August 4, (E. H. Strickland). Two specimens referred to this species with some doubt.

## BEMBICINAE

*Bembix spinolae* Say. Females, Brooks, July 27, (H. L. Seamans); Duchess, July 27, (Walter Carter); Cassils, July 26, (Walter Carter).

*Bembix primaestate* Johnson & Rohwer. One male, Cassils, July 26, (Walter Carter).

*Stictiella emarginata* Cresson. Females, Lethbridge, July 31, (H. E. Gray); August 6, (Walter Carter); males, Lethbridge, August 6, (H. L. Seamans).

## STIZINAE

*Stizus uncinatus* Say. A series of both sexes, Lethbridge, August 5 to 21, (E. H. Strickland); female, Chin, July 25, (E. H. Strickland); male and female, Milk River, August 9, (H. L. Seamans).

***Crabro pratus* new species.**

*Female.* Clypeus with a triangular depression in anterior middle. Margin sinuate. Pubescence white, recumbent. Front, vertex and ocelli rugose.

Median impressed line indistinct. Postocellar and ocellocular lines subequal. Cheeks rugose except orally where they are smooth, shining and sparsely though distinctly punctured.

Pronotum laterally with a small tooth. Mesonotum distinctly and closely punctured. Mesepisternal suture foveolate. Mesopleura smooth, shining, sparsely punctured. Scutellum and metanotum punctured but not nearly so strongly as mesonotum. Both have deep foveae laterally. Those of the metanotum are themselves foveolated. Disc and posterior face of the propodeum slightly rugose, the former tending towards striation. Median groove on disc foveolated, the posterior surface smooth. Sides of propodeum smooth, shining.

Abdomen punctured, but more distinctly on the first and fifth tergites. Larger punctures in rows on caudal margins of the sternites. Pygidium closely punctured and with recumbent hair which has a bronze reflection at the tip. Color; black, base of mandibles, two large confluent spots on clypeus, scape except small inner spots on pronotum, spot on prothoracic lobes, faint spots on tegulae, narrow spot on scutellum, all the tibiae except black spots within, first joints of tarsi, yellow. Remaining tarsal joints testaceous. Spots on dorsal abdominal segments one to five, those of the fifth deeply emarginate laterally, light yellow.

Wings hyaline. Nervures light testaceous. Stigma light brown. Length 9 mm.

*Holotype*—♀, Chin, Alberta, June 29, (H. E. Gray); No. 1422 in the Canadian National Collection, Ottawa.

*Paratype*—♀; Chin, Alberta, June 29, 1923, (H. E. Gray); in the University of Alberta collection.

The paratype has the spots of the fourth and fifth segments united into bands, those of the fifth inclose small black spots. There is also a small yellow spot laterally on the second sternite. The pronotal tooth is not as evident on the paratype as on the type.

This species is allied to *C. thyreophorus* but differs in the puncturation and maculation.

#### ***Crabro veles* new species.**

*Male*. Clypeus slightly produced into a truncated process with a short tooth on each side of the truncation; covered with rather long recumbent pubescence. Front striato-rugose; shining. Cheeks shining, the oral portion striato-rugose. Upper part of cheeks and vertex rugose.

Mesonotum striate with a few small punctures scattered among the striae. Mesepisternal suture deeply foveolate. Ridges along the base of the mesopleura make a series of shallow foveae. Metapleura marked by foveolated sutures. Scutellum longitudinally striated, as is the metanotum, but the latter has fewer stria. Sides of propodeum shining and smooth. Above, the propodeum is deeply reticulate. Posteriorly there is a deep median furrow which separates two slightly reticulate areas, both of which are margined by distinct ridges. Abdomen elongate; shining; impunctate. The last sternite is deeply emarginate so that it appears to end in two spines.

Color black. Scape except for spot within, fore femora mostly, fore tib-



iae except line on each side, middle tibiae except large spot within, base of hind tibiae, first joint of all the tarsi, yellow. Remaining tarsal joints testaceous. Small spots on first abdominal segment; spots on second, deeply emarginate anteriorly; pair of elongate spots on third, fourth and fifth; very small spots on sixth, yellow. Sternum immaculate.

Tibial shield, small. Inner margins bilobed, outer margin straight. Base yellow with black spot near apex of tibia. Remainder brown with a series of sinuous light areas on the inner surface, running from the base to the bilobed inner margins of the shield. Wings hyaline. Nervures brown. Stigma darker brown. Length 8 mm.

*Holotype*—♂, Edmonton, July 1, (E. H. Strickland); No. 1421 in the Canadian National Collection, Ottawa.

Female unknown.

### ***Crabro albertus* new species.**

*Male.* Clypeus with broad but short truncation which is slightly emarginate and its lateral angles sharp. Front, vertex and cheeks closely punctured. Distance between hind ocelli less than that between them and nearest eye margin.

Pronotum rounded at sides. First joint of fore tarsi distinctly sinuate. Mesonotum closely but not deeply punctured except disc which is striato-punctate with rather deep punctures. Mesepisternal suture foveolate. Scutellum and metanotum punctured as the sides of the mesonotum. Suture between meso- and meta-pleura deep with tiny foveae on lower half but faint and without foveae on upper half. Suture between metapleura and propodeum deeply foveolate. Disc of propodeum with two raised shining areas which are completely margined by deep foveae. Between these shining areas is a flask-shaped foveolate depression which connects with a median groove which is without foveae. Posterior face shining, impunctate. Sides shining with a very few scattered weak punctures.

Abdomen with very faint puncturation.

Color black. Scape entirely except for narrow lines within, prothoracic lobes, fore and middle tibiae except large spots within, hind tibiae except spot on apex, first joint of all the tarsi, large elongate spots on second, third and fourth segments, very small spots on fifth segment, yellow. The antennae are testaceous beneath on the proximal half. The fore tibia has a testaceous band between the yellow and the black. All the tarsal joints except the first are testaceous.

Wings hyaline. Nervures testaceous. Stigma, a spot on the radial cell, spot at the apex of the marginal cell and spot in the lower corner of the cubital cell, dark brown. Length 10 mm.

*Holotype*—♂, Waterton Lakes, July 13, 1923, (E. H. Strickland); No. 1420 in the Canadian National Collection, Ottawa.

Related to *C. maculipennis* Smith and belongs to Fox's "*nitidiventris*" group.

### ***Solenius seamansi* new species.**

*Male.* Clypeus produced into a median truncated lobe. Clypeus covered with closely appressed pubescence. Between the antennal groove and the eye

margins is a band of silvery pubescence. Front deeply and closely punctured and covered with erect golden hair. Vertex and occiput and cheeks closely punctured and with recumbent hair which varies from reddish brown on the occiput to white on the oral part of the cheeks. Last joint of flagellum flattened beneath so that it appears spatulate. Mandibles with a few scattered golden hairs. Pronotum distinctly carinate and with lateral teeth. Deeply punctured and with a central furrow. Longitudinally striate; at sides also.

Mesonotum with large confluent punctures. Mesopleura with close small punctures next to the sternum, scattered deep punctures medially and a few longitudinal striae interspersed with punctures on the portion which meets the tegulae. Scutellum covered with deep confluent punctures. Metanotum with longitudinal striae interspersed with occasional punctures. Metapleura anteriorly margined by deep foveae; impunctate with coarse striae. Sides of propodeum similarly striated. Rest of propodeum deeply and coarsely reticulate.

Abdomen distinctly punctate both dorsally and ventrally. Legs, fore femora with tooth on inner margin. Fore tarsi distinctly flattened. Color black. Scape except spot within, two spots on pronotum, prothoracic lobes, apex of fore femora, spot at apex of middle femora, front tibia except within, where it is light testaceous, middle tibia except black within, line on outer margin of hind tibia, yellow. Tarsi testaceous, the fore tarsi being much lighter than meso- and metatarsi. Wings hyaline, nervures brown-testaceous.

*Holotype*: ♂, Waterton Lakes, Alberta, July 11, 1923, (H. L. Seamans); No. 1423 in the Canadian National Collection, Ottawa.

Belongs to the "*interruptus*" group of Fox's monograph. Female unknown. I take pleasure in naming this species after Mr. H. L. Seamans, Entomologist in charge of the Lethbridge Laboratory.

## SIX NEW SPECIES OF FRANKLINIELLA AND A KEY TO THE AMERICAN SPECIES.<sup>1</sup>

BY A. C. MORGAN,

Bureau of Entomology, U. S. Dept. of Agriculture.

The addition of six new species to this our largest genus of American Thysanoptera justifies, I think, the inclusion of a key for the separations of the twenty-four species and five varieties here recognized.

For the form *tritici* described by Moulton (Tech. Ser. No. 21, Bur. Ent. U. S. Dept. Agr., 1911) under the varietal name, *californicus*, I agree with Mr. J. D. Hood<sup>2</sup> that the name was preempted by *E. ulicis californicus* and have restored the name *moultoni* as suggested by Mr. Hood (loc. cit.).

The description of *F. cephalica* Crawford and *F. melanommatus* Williams suggest the same species in most respects but it seems to me that the differences pointed out by Mr. Williams<sup>3</sup> certainly entitle *melanommatus* to varietal rank, at least, and I have so ranked it in this paper. Also the fact that *cephalica* was collected in the mainland and *melanommatus* on an island strengthens us in the conclusion that the differences of the two forms are very probably constant

(1)—Frankliniella, Karny, Order Thysanoptera; Suborder Terabrantia Family Thripidae.

(2)—Proc. Ent. Soc. Wash. Vol. XVI, 1914, p. 38.

(3)—Jour. Econom. Biol., 1913, Vol. VIII, No. 4, p. 215.

and not simply variations in a not well fixed species, since interbreeding of the two is manifestly prevented by natural barriers.

KEY TO THE AMERICAN SPECIES OF FRANKLINIELLA

1. Wings with a basal fifth to third decidedly lighter colored than remainder of wing (In *stylosa* the clear area is often not clearly marked ... Division A. Wings, when present, uniformly colored throughout, (The wingless form of *fusca* belongs here) ..... 2.
2. Tenth segment of female entire above ..... Division B.
2. Tenth segment of female either split open or sulcate above for at least  $\frac{3}{4}$  its length ..... Division C.

Division A. includes *annulipes*, *auripes*, *australis*, *citripes*, *insularis*, *stylosa*, *tenuicornis*.

1. Fore tibiae differing markedly in color from middle or hind tibiae ..... 2.
- Fore tibiae not differing markedly in color from middle or hind tibiae ..... 4.
2. Both fore and middle tibiae yellowish ..... *tenuicornis* Uzel.
- Fore tibiae differing in color from middle tibiae ..... 3.
3. Apex of fore femora, bases of middle and hind femora and tibiae clear pale yellow ..... *annulipes* Hood.
- Apex of fore femora, bases of middle and hind femora and tibiae brown like remainder of the respective segments ..... *insularis* Franklin.
4. All tibiae and tarsi clear lemon yellow ..... 5.
- All tibiae and tarsi yellowish gray or brown ..... 6.
5. Prothorax distinctly longer than the head ..... *citripes* Hood.
- Prothorax about equal in length to head ..... *auripes* Hood.
6. All femora at most only gray brown or slightly infusate, 1st. antennal segment much lighter than 2nd. .... *stylosa* Hood.
- All femora brown to dark brown, 1st. antennal segment brown like 2nd. .... 7.
7. 4th. antennal segment lighter than 5th. 8th. abdominal segment with comb of bristles except toward sides, intermediate abdominal segments not lighter than thorax ..... *nubila* Treherne.
- 4th. antennal segment not lighter than 5th. 8th. abdominal segment with entire dorsal row of comb-like bristles dorsally, intermediate abdominal segments lighter than thorax ..... *australis* n. sp.

Division B. includes *cephalica*, *helianthi*, *gilmorei*, *occidentalis*, *runneri*, *tritici*.

1. Second segment of antennae enlarged at tip on dorsal side and bearing two heavy spines (asymmetrical in side view) ..... 2.
- Second segment of antennae normal ..... 6.
2. Vertex of head depressed, anterior ocellus directed forward ..... 3.
- Vertex of head not depressed, anterior ocellus directed nearly vertically .... *tritici bispinosa* Morgan.
3. Antennal segment 3 a little longer than 2, abdomen slender ..... 4.
- Antennal segments 2 and 3 about equal in length, abdomen short ..... *cephalica masoni* Watson.
4. Body yellow, surface not reticulated ..... 5.
- Body uniformly brown, surface reticulated ... *cephalica reticulata* Crawford.
5. 8th. antennal segment shorter than 7th ..... *cephalica* Crawford.

- 8th. antennal segment longer than 7th. . . . *cephalica melanommatus* Williams.
6. Antennal segments 1 and 2 not differing markedly in color—both either dark brown or both pale yellow, or whitish, the second sometimes shaded a little darker than first . . . . . 7.  
Antennal segments 1 and 2 differing markedly in color. 1 pale yellow to whitish, 2 light brown to dark brown . . . . . 9.
7. 1st. antennal segment dark brown . . . . . *moultoni* Hood.  
1st. antennal segment yellow, never dark brown . . . . . 8.
8. Mouth cone reaching across prosternum, constricted before tip, pointed, hind vein bears 11-13 spines . . . . . *gilmorei* n. sp.  
Mouth cone not reaching entirely across prosternum, sides straight, tip rounded, hind vein bears only 9-10 spines . . . . . *runneri* Morgan.
9. Ocellar crescents irregular in shape, blotches, orange yellow in color . . . . .  
Ocellar crescents regular in shape, reddish orange . . . . . 10.  
Ocellar crescents regular in shape, reddish orange . . . . . 10.
10. 5th. antennal segment  $\frac{5}{6}$  as long as 4, wings nearly always with 2 cross veins. 1st. antennal segment translucent whitish . . . *occidentalis* (Pergande).  
5th. antennal segment  $\frac{3}{4}$  as long as 4, wings without cross veins, 1st. antennal segment pale yellow . . . . . *tritici* (Fitch).  
Division C. includes *canadensis*, *claripennis*, *fusca*, *gossypii*, *minuta*, *nervosa*, *trehernei*, *tympanona*, *unicolor*, *varicorne*, *williamsi*.
1. Postocular bristles weak—short, thin—and inconspicuous, or wanting . . . . . 2.  
Postocular bristles conspicuous, long and usually stout . . . . . 6.
2. Sternite of abdominal segment 3 of female with transversely elliptical pale area just before middle, slightly smaller than first antennal segment . . . . .  
Sternite of 3rd. abdominal segment without pale area . . . . . 3.  
Sternite of 3rd. abdominal segment without pale area . . . . . 3.
3. Whole insect conspicuously stramineous by reflected light and yellow by transmitted light . . . . . *unicolor* n. sp.  
Whole insect dark yellowish brown to dark brown . . . . . 4.
4. Head very noticeably though obtusely angular in front . . . . . *nervosa* (Uzel).  
Head not noticeably angular in front . . . . . 5.
5. Winged, wingless or brachypterous, mouth cone abruptly constricted toward tip, pointed, reaching nearly to prosternum . . . . . *fusca* Hinds.  
Winged, mouth cone short and not constricted, broadly rounded . . . . .  
Winged, mouth cone short and not constricted, broadly rounded . . . . . *minuta* Moulton.
6. 2nd. antennal joint, gray brown to dark brown, insects either dark brown or—as in *claripennis*—dark brown in 9th. and 10th. abdominal segments . . . 7.  
2nd antennal segment very light colored, pale yellow, nearly white, or at most only slightly fuscous on margins; insects pale yellow or nearly white . . . 9.
7. 1st. antennal segment grayish yellow—much lighter than 2nd. segment . . . . .  
1st. antennal segment brown—not much lighter than 2nd. segment . . . . . 8.
8. Thorax decidedly yellowish or yellowish brown and markedly differing in color from abdomen, wings without cross veins . . . . . *claripennis* n. sp.  
Thorax usually lighter brown than abdomen but not yellowish or yellow



- brown, 2 cross veins often visible between costa and anterior vein .....  
 ..... *canadensis* n. sp.
9. Thorax, outer surface of legs and 10th. abdominal segment darkened with orange, ocellar crescents red ..... *williamsi* Hood.  
 Thorax not appreciably darker than remainder of body, ocellar crescents not visible—transparent ..... 10.
10. 3rd. antennal segment considerably longer than the 6th. Length of species about 1.4 mm. .... *trehernei* n. sp.  
 3rd. antennal segment no longer than the 6th. Length of species only about 1.1 mm. .... *gossypii* Morgan.

***Frankliniella australis* n. sp.**

*Female*: color. Head, thorax, all femora, middle and hind tibiae, 9th. and 10th. abdominal segments and all but 3rd. antennal segment deep brown. Remainder of body light brown, all tarsi gray, fore tibiae gray along center but very distinctly fuscous on sides, fore wings gray brown, distinctly darker than the clear area at base, hind wings gray, all spines brown to dark brown and conspicuous.

Head about  $1\frac{1}{2}$  times as broad as long, broadest at the middle, very slightly arcuate in front; eyes occupy a little more than half the width of the head and a very little less than half the length, rather finely faceted; ocelli very large—much larger than the facets of compound eye—widely separated, although the large, deep orange crescents that border them inwardly are approximate at their inner margins; behind the eyes rather coarsely and deeply transversely striate—one of the striae more prominent than the others. Interocellar and postocular bristles prominent; the interoculars situated well inside an imaginary line connecting the centers of posterior and anterior ocelli. Cheeks convex, slightly roughened with one short distinct spine, anteriorly directed just back of middle. Mouth cone evenly cone-shaped and extending about  $\frac{3}{4}$  across prosternum. A row of six tiny spines may be seen between postocular bristles. Antennae with third segment bearing a pseudo joint at the base, and stalked, four joined to three rather broadly and four and five are thicker at base than in *F. insularis*. Spines on antennae well developed and brown. The usual sense cones on 3 and 4 and a long slender simple cone on inner side of 6.

Prothorax fully  $1\frac{1}{2}$  times as broad as long, broadest at middle, posterior angles broadly rounded, spines at the angles prominent and dark brown, posterior and anterior marginals equal in size but only about  $\frac{3}{4}$  as large as those at the angles; the usual row of small spines is present on the posterior margin, also a row of about 8 tiny spines on anterior margin between spines at angles. In addition to the large spine on anterior angle there is also a much smaller and shorter anteriorly directed spine. Surface rugulose with weak transverse striae near posterior margin. Mesothorax broad with spines as in *F. insularis*. Wings reach to middle of 8th. abdominal segment (specimen somewhat distended), broadest at the base, at the middle  $1\frac{1}{11}$  as broad as long, basal fifth gray, remainder of wings distinctly darker, gray brown; costa bears about 24 to 26 spines, anterior vein 19 to 20, posterior vein 14 to 17. Legs of moderate size, the usual spines strong and the surface of all pairs clothed with numerous small spines.

Abdomen normal to genus. Posterior margin of 8th. dorsal plate with a row of spiniferous tubercles. Spines on last two segments long and strong, dark brown. Tenth segment split open above for about  $\frac{7}{8}$  its length.

Measurements of Holotype: Length 1.3 mm. specimen slightly distended; head, length 0.114 mm. width 0.167 mm.; prothorax, length 0.122 mm.; width 0.195 mm.; mesothorax width 0.248 mm.; abdomen, width at 5th. segment 0.285 mm. Dimensions of antennae in microns:

	1	2	3	4	5	6	7	8
Length	24.4	43	53	46	36	53	11	19
Width	28	24.4	22	22	18	20	7	5

Wing at middle 69 microns in width.

Described from 12 females collected from blossom of *T. candicans*, Villa Vicencio So. America, March 13, 1921. E. E. Blanchard collector.

*Male allotype*, 1.12 mm. long, head length 0.106 mm., width 0.163 mm.; prothorax, length 0.134 mm., width 0.195 mm.; mesothorax, width 0.224 mm.; abdomen, width 0.204 mm. All spines somewhat stouter than in the female. Head more deeply striate, whole insect darker than female, particularly the abdomen which is gray brown. Ventral abdominal plates 3 to 7 each with a conspicuous, gray sole-shaped area near the middle. On each side, about midway the 9th abdominal segment near the dorsum, may be seen a very stout sharp spine, half-way to lateral margin stands another very strong and longer spine, though not so stout as the preceding; each lateral posterior angle bears a stouter and much longer spine than either of the two preceding; on the posterior margin two very stout spines are to be found each side the meson, one on each side the second spine of the preceding three and about half-way between it and the spine at meson and lateral angle respectively; of these two spines the outer one is not more than  $\frac{1}{3}$  as long as the one at the posterior angle and the one near the meson not more than  $\frac{1}{3}$  as long as the outer, but much stouter. Each lateral posterior margin of the 10th. segment bears a heavy incurved spine slightly longer than the one at the lateral angle of the 9th. segment. Length of antennal segments in microns:

1	2	3	4	5	6	7	8
24.4	38	53	44.9	36	53	11	17

Described from 1 male taken in company with the Holotype.

This well marked species is very closely related to *F. insularis*, Franklin, from which it may be easily distinguished by the greater comparative differences in the lengths of the 7th. and 8th. antennal segments and by the position of the interocellar bristles. In *F. insularis* these bristles would touch the line tangent to the outer margins of the anterior and posterior ocelli. In *australis* these bristles stand inside the line from center to center of anterior and posterior ocelli. The coloration of the antennae is distinctive as is also the heavier construction of the fourth segment basally.

#### **Frankliniella gilmorei** new species.

*Female*: color by reflected light; abdomen, legs, head, and first five—and base of 6—antennal segments very light lemon, thorax light lemon, eyes dark red,

distal antennal segments fuscous; mouth cone tipped with black, wings practically transparent, the head washed with lemon in front. By transmitted light the whole insect is pale yellowish, deeper in thorax, eyes black, tip of mouth cone black, distal antennal segments—outer half of six and seven and eight—light brown to fuscous.

Head fully  $1\frac{1}{2}$  times as broad as long, slightly arcuate in front between eyes, only very slightly produced between antennae, cheeks slightly swollen, convex, and bearing a few tiny colorless spines; eyes occupy nearly  $\frac{3}{5}$  the width of head through them and about  $\frac{1}{2}$  the length, facets of moderate size, slightly pilose; ocelli situated far back, large, the posterior ones in line with posterior margins of compound eyes, margined inwardly with large orange crescents. Interocellar bristles well developed, brown, postoculars weak. Mouth cone long, reaching across prosternum, pointed, its sides concave in outline, tipped with black. Antennae about  $2\frac{1}{4}$  times as long as head, the segments comparatively broad and heavy.

Prothorax about  $1\frac{1}{2}$  times as broad as long. All of the usual spines present, sides only slightly convex, mesothorax about  $\frac{1}{8}$  broader than prothorax, wings at middle  $\frac{1}{11}$  as broad as long, reaching to 8th. abdominal segment, costa bears about 22—23 spines, anterior vein 19—20, posterior vein 11—13. Legs moderate in size.

Abdomen normal in size, bluntly conical, spines on last two segments well developed and light brown. Tenth segment entire above.

Measurements of holotype: Length 1.00 mm. Head, length 0.08 mm., width 0.138 mm.; prothorax, length, 0.114 mm., width 0.163 mm.; mesothorax width 0.189 mm.; abdomen, width, 0.232 mm. Dimensions of antennal segments in microns:

	1	2	3	4	5	6	7	8
Length	20.4	36.7	40.8	36.7	30.	40.8	8	12
Width	24.4	24.4	19	19	18	17	7	5

Described from 8 females collected from a species of mint, Clarksville, Tenn., May 20, 1915. Named for the collector, Mr. J. U. Gilmore. No males found.

This little species may be easily distinguished from its nearest relative, *F. runneri*, Morgan, by the different shape and size of the mouth cone. In *F. runneri* the mouth cone has straight sides and reaches only about  $\frac{2}{3}$  across the prosternum, while in the present species it extends clear across the prosternum, is pointed and the lateral margins are distinctly concaved.

#### **Frankliniella unicolor new species.**

*Female*: Color by reflected light, light stramineous; the wings almost transparent, the head lighter than prothorax and body grayish; the first two joints of antennae gray, third, fourth and basal half of fifth segments light stramineous; remainder of fifth, sixth, seventh and eighth light brown to fuscous; eyes dark red, ocellar crescents red; by transmitted light, whole insect light yellow except distal half of fifth antennal segment, and all of sixth, seventh and eighth, fuscous, eyes black, ocellar crescents red.

Head only about  $1/12$  wider than long, bluntly angular in front, broadest across eyes which protrude slightly, cheeks slightly convex; eyes occupy very little more than half the width of the head and only about  $2/5$  of its length; ocelli situated far back on head, the posterior ones close to inner margins of eyes; interocellar and postocular bristles thin and short, the interocellar bristles are unusually far forward, almost on a line with back of anterior ocellus and almost on line with inner margins of posterior ocelli; mouth cone reaches about  $3/4$  across prosternum.

Prothorax, about  $1/5$  wider than long, sides nearly straight and parallel. All the usual spines present, although reduced in size, particularly the anterior marginals which are very small. Mesothorax  $1/3$  wider than prothorax, weakly spined; legs rather short and stout; wings reach barely to 7th. abdominal segment, at middle  $1/12$  as broad as length, costa bears about 21 spines, anterior vein about 17, posterior vein 11, all of which are light brown.

Abdomen increasing in width to the 5th. segment thence sides almost parallel to 8th. segment, the anterior margin of which nearly equals greatest width of body, remainder of body evenly conical to the tip of 10th. segment which is sharp pointed and weakly sulcate above for at least  $3/4$  its length. Spines on 9th. and 10th. segments long, slender and light yellow.

Measurements: Length 1.22 mm.; head, length 0.137 mm., width 0.146 mm.; prothorax, length 0.130 mm., width 0.159 mm.; mesothorax, width 0.215 mm.; abdomen greatest width at 5th. segment 0.228 mm. Dimensions of antennal segments in microns:

	1	2	3	4	5	6	7	8
Length	20	32.6	44.9	40.8	38	53	10	15
Width	32	28	18	18	16	18	8	6

Described from one female taken in stool of "brown sedge", *Andropogon virginica*, Clarksville, Tenn., April 20, 1915, A. C. Morgan collector.

This species may be distinguished from *F. williamsi*, Hood, by the relative lengths and widths of the head and prothorax and by the lesser number of spines on the wing.

#### ***Frankliniella claripennis* new species.**

Female:—color. In dark specimens, the abdomen is deep brown, darker at tip, the meso- and metathorax yellow-brown; the prothorax lighter yellowish brown, the head light brown, the legs light brown throughout, the tarsi somewhat paler than femora and tibiae. In the lighter colored specimens the abdomen is gray-brown, becoming darker toward the tip, the 9th. and 10th. segments being deep brown; the meso- and metathorax are bright yellowish brown; the prothorax and head gray-brown, the legs colored like first half of abdomen, except the femora which are slightly fuscous on sides; the wings are gray; antennae brown, gray in basal half of 3, basal third of 4 and extreme base of 5; segment 1 is slightly lighter than 2 and distal half of 3 is lighter than 1.

Head fully  $1\frac{1}{2}$  times as wide as long, weakly transversely striate behind eyes, cheeks diverging slightly behind, front weakly arcuate between antennae; eyes, weakly pilose, occupying about  $3/5$  of the width of head and only slightly less than half its length, light yellowish gray, ocelli situated well back on head,



posterior ones widely separated and very close to inner margins of compound eyes, margined inwardly with narrow orange crescents; interocellar and postocular bristles alone prominent and brown; mouth cone pointed and reaching nearly across prosternum.

Prothorax about  $1/10$  longer than head and slightly more than  $1\frac{1}{2}$  times as wide as long; all of the usual spines present, brown, slender and long, a short, stout, anteriorly directed spine very near the long spine on anterior angle, posterior angles broadly rounded; both meso- and metathorax broad and heavy; legs of medium length and rather stout, noticeably striate, surface clothed conspicuously with slender brown spines, the usual spines at tips of fore and hind tibiae and on inner margin of hind tibiae. Wings nearly reaching tip of abdomen, at middle about  $1/12$  as broad as long; costa bears about 26 spines, anterior vein about 22 and posterior vein about 15.

Abdomen broader than pterothorax. Segment 10, only slightly longer than basal width, split open above. Spines long, brown and prominent.

Measurements: Length 1.24 mm. to 1.4 mm.; Head, length 0.122 mm., to 0.13 mm.; width 0.163 mm., to 0.179 mm.; prothorax, length, 0.13 mm., width 0.213 mm.; mesothorax, width 0.29 mm.; abdomen, width about 0.32 mm. Length of antennae in microns:

1	2	3	4	5	6	7	8
<hr/> 25	<hr/> 38	<hr/> 61	<hr/> 55	<hr/> 40.8	<hr/> 58	<hr/> 11	<hr/> 14

Described from 5 females collected from *Schizonotus discolor*, Wenatchee, Wash., June 29, 1916. E. J. Newcomer collector. No males found.

***Frankliniella canadensis* n. sp.**

*Female*.—Length about 1.4 mm. General color: abdomen deep brown; thorax and head a deep brown somewhat lightened by yellow, (by reflected light) distinctly yellowish brown with vertex of head, margins of compound eyes and tips of femora almost white; fore wings *very lightly* washed with yellow; hind wings colorless; antennae brown, except basal half of segment 3 extreme base of yellowish brown, sometimes also base of 5, gray by reflected light; femora brown, tibiae yellow brown, tarsi light yellowish brown.

Head about 1.5 times as wide as long slightly arcuate in front, cheeks very slightly roughened and nearly parallel; occiput with a few transverse lines; interocellar and postocular spines strong, dark brown and prominent. Eyes moderate in size occupying a little more than half the width of the head. Ocelli large, placed well back on the head, the anterior ocellus being very little in front of middle of compound eyes, margined inwardly with dark orange crescents. Mouth cone reaches nearly across prosternum. Antennae moderately stout and long, about  $2\frac{1}{2}$  times as long as head, spines brown, long, stout and prominent; form of segments normal to the genus; segment 3 equal to or longer than 6. Segments 1 and 2 deep brown like the abdomen; 3 gray or yellowish brown in basal half; apical half light brown, sometimes gray brown; 4 light brown; 5 light brown, infusate on sides; 6-8 uniform light brown.

Prothorax about  $1\frac{1}{2}$  times as wide as long and only about  $1/6$  longer than the head, the prominent pair of bristles on each posterior angle, the one on each anterior angle and the two bristles on the anterior margin, long, strong, brown

and scarcely differing in size; the two longest bristles on the posterior margin are similar to the pair on the posterior angle in form and color but only about half as long. Prothorax normal to the genus; the pair of brown bristles on the anterior margin of metascutum about as long as the length of that plate, the spines at each lateral margin of the plate somewhat smaller and lighter in color. Legs normal to the genus, the fore femora moderately stout. Wings reaching nearly to tip of 8th. abdominal segment upon somewhat distended specimens. Costa bears 24 to 28 spines; anterior vein 17 to 22; posterior vein 14 to 18. Width of anterior wing at middle about  $1/12$  its length. There are usually two cross veins between costa and anterior vein, one at end of the basal third, the other at end of three-fifths the wing's length.

Abdomen normal to the genus, a broad dark band crosses segments three to eight dorsally near anterior margin. Posterior margin of segment 8 with about 14 spine-like projections as in *stylosa*. Tenth segment split open above.

Measurements of holotype; length 1.53 mm.—specimen only distended about .05 mm. Head, length .134 mm., width .191 mm.; prothorax, length .15 mm., width .22 mm. Mesothorax width .336 mm.; abdomen width .362 mm. Antennal segments, length in microns, 1—28.5, 2—44.9, 3—57., 4—55., 5—40.8, 6—51., 7—11., 8—18.; total length antennae .306 mm.

Described from 34 females, 2 females including holotype collected at Mission, B. C., October 5, 1916, on "Prune or Cherry"; 5 females off *Lupinus* sp. 4 females off *Cysticus scoparius*, June 6, 1916, 8 females in late apple bloom, June 12, 1916, Royal Oak, B. C.; 4 females off blooms of *Gallardis aristata*, August 21, 1916, Penticton, B. C.; 3 females on *Prunella vulgaris*, August 22, 1916, 2 females on *Prunella vulgaris*, Aug. 26, 1916, 5 females from blooms of *Dahlia*, Aug. 26, 1916, 1 female from *Chicory* blooms Aug. 27, 1916, Vernon, B.C. R. C. Treherne collector.

This species may be differentiated from *stylosa*, Hood, by its coloration and greater size, also by the presence of cross-veins in the wing.

Since drawing up the above description, I have received this species from the following host plants and localities; Fort Collins, Colorado, 32 females on one slide, swept from Alfafa, July 2, 1910, Webster No. 1621, C. N. Ainslie collector; Billings, Mont. 7 females, from Red Clover, June 29, 1923, H. L. Sweetman collector; Yakima, Washington, in Apple Blossoms, 6 females May, 1922, 3 slides Quaintance Nos. 14158, 14157 and 14162, E. J. Newcomer collector; California on peach, May 6, 1920, 2 females, G. P. Weldon, collector; Mt. Ranier, Wash. elevation 5678 ft., 31 females on "blue lupine", "Mountain aster", heliotrope, Ash, pink heather and "squaw-grass", July 15, 1922, S. T. (Mrs. A. C.) Morgan, collector.

#### ***Frankliniella trehernei* n. sp.**

*Female*:—Length about 1.4. General color very pale grayish yellow with tip of mouth cone distal ends of antennal segments 2, 3 and 4 and all of segments 6-8 light brown, tips of segments 2, 3 and 4 lighter brown than segments 6-8 and tip of mouth cone; wings gray, fringe and spines very light yellowish brown. Legs evenly colored throughout like the body.

Head about 1.5 times as wide as long, cheeks parallel; occiput with a few indistinct transverse lines; interocellar and postocular spines light brown and

prominent, the interocellar spines somewhat longer than the postocular. Eyes moderate in size occupying very slightly more than half the width of the head, the yellow pigment being a little deeper than on abdomen. Ocelli present, placed well back on the head and widely separated, the posterior ones contiguous to margins of compound eyes and at about  $\frac{1}{4}$  the length of the compound eye from its posterior margin, larger than facets of compound eye, crescents not visible. Antennae about 2.5 times as long as the head, spines moderate in size and light brown; form of segments normal to the genus: segment 1 gray, 2, 3 and 4 grayish yellow in basal half, shading to very light yellowish brown apically, 5 grayish except tip which is yellowish gray, 6-8 light brown. Mouth cone extending about  $\frac{3}{4}$  across prothorax, tipped with black, slightly narrowed toward the tip.

Prothorax  $1\frac{1}{2}$  times as wide as long, diverging slightly posteriorly. All the usual spines present, dark brown, the large spines on anterior and posterior margins only about  $\frac{3}{4}$  as long as those at the angles. Angles rounded. Fore femora stout. Fore wings very pale. Grayish yellow throughout, at the middle about  $\frac{1}{10}$  as wide as long, evenly set with long yellowish bristles of which there are about 24 on costa, 20 on anterior vein and 16 on posterior vein. The posterior fringe on both pairs of wings is lightly tinged with brown.

Abdomen slightly broader than pterothorax; all spines on abdomen brown, those at the tip quite prominent, long and slender. 10th. segment split open above nearly its entire length.

Measurements of holotype: Length 1.48 mm.—specimen distended about .08 mm. Head, length .13 mm., width .191 mm.; prothorax, length .159 mm., width .24 mm.; mesothorax, width .367 mm.—specimen slightly flattened, probable width only about .346 mm.; abdomen, width .367 mm. Antennal segments, length in microns; 1—30., 2—40.8, 3—61.2, 4—55., 5—40.8, 6—53., 7—10., 8—16.3; total length antennae .305 mm.

*Allotype*, colored like female but smaller and more slender, the abdomen being only slightly more than  $\frac{1}{2}$  as broad.

Measurements. Length 1.24 mm.; head, length 0.106 mm., width 0.146 mm.; prothorax, length 0.118 mm., width 0.179 mm.; mesothorax, width 0.244 mm.; abdomen width 0.183 mm. Length of antennal segments in microns:

1	2	3	4	5	6	7	8
26	36.7	53	44	38	48	8	14

9th. abdominal segment bears on each lateral margin two heavy dark brown spines, the one midway on margin being nearly as stout but only  $\frac{2}{3}$  as long as the one at lateral angle, on posterior margin dorsally, near the spine at lateral angle is a somewhat smaller spine but equalling it in length; each side the meson is a stout spine only about half as long as the preceding. Each posterolateral margin of the 10th. segment bears an in-curved spine equal in size and length to those at lateral angles of 9th. segment.

Described from 8 females and 3 males collected by Mr. R. C. Treherne as follows: 3 females, including holotype, Naramata, B. C. Aug. 22, 1916, from Buckwheat; 2 females, Penticton, B. C., Aug. 22, 1916, off Clover bloom; 3 females and 1 male—allotype—Penticton, B. C., Aug. 21, 1916, off Yarrow

bloom; 2 males, Vernon, B. C., Aug. 27, 1916, off Chicory bloom.

Named in honor of the late R. C. Treherne, the able Canadian Thysanopterist who collected the species.

This species stands very close to *F. gossypii* but may be distinguished therefrom by its greater size and by having the 3rd. antennal segment distinctly longer than the 6th. For comparison the length of the antennal segments of the type of *F. gossypii* are given below:

1	2	3	4	5	6	7	8
24	36	46	41	34	46	8	12

REFERENCE TO ORIGINAL DESCRIPTIONS, OR TO REDESCRIPTIONS.

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*F. cephalica* Crawford—*Euthrips cephalicus* Crawford, Pomona Jour. of Ent., 1910, Vol. II, No. 1, p. 153.  
*F. cephalica masoni* Watson—Fla. Buggist, 1919, Vol. III, No. 1, p. 3.  
*F. cephalica melanommatus* Williams—Jour. Econ. Biol., 1913, Vol. VIII, No. 4, p. 213.  
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*F. gossypii* Morgan—*Euthrips gossypii* Morgan—Proc. U. S. Nat. Museum, 1913, Vol. 46, p. 9.  
*F. helianthi* Moulton.—*Euthrips helianthi* Moulton—U. S. Dept. Agr. Tech. Ser. Bul. No. 21, 1911, p. 40.  
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*F. nubila* Treherne.—Can. Ent., 1924, Vol. LVI, No. 4, p. 84.  
*F. occidentalis* (Pergande).—*Euthrips occidentalis*, Proc. U. S. Nat. Mus., 1902, Vol. XXVI, No. 1310, p. 152. Redescription by Hinds.  
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*F. stylosa* Hood.—Proc. Ent. Soc. Wash., 1912, Vol. XIV, No. 3, p. 134.  
*F. tritici* (Fitch).—*Euthrips tritici* (Fitch) Proc. U. S. Nat. Mus. 1902, Vol. XXVI, No. 1310, p. 148. Redescription by Hinds.  
*F. tritici bispinosa* Morgan.—*Euthrips tritici bispinosus* Morgan, Proc. U. S. Nat. Mus., 1913, Vol. 46, p. 10.



*F. tympanona* Hood.—Insec. Insc. Menst., 1915, Vol. III, Nos. 1-4, p. 21.

*F. tenuicornis* Uzel.—*Physopus tenuicornis* Uzel, Monogr. der Ord. Thys. 1895, p. 99.

*F. varicorne* Bagnall.—Ann. Mag. Nat. Hist., 1919, Vol. 4 No. 22, p. 268.

*F. williamsi* Hood—Insec. Insc. Menst., 1915, Vol. III, Nos. 1-4, p. 19.

## NEW MICROLEPIDOPTERA FROM THE SOUTHWEST

BY ANNETTE F. BRAUN,

Cincinnati, Ohio.

### *Lithocolletis manzanita* n. sp.

Palpi white, blackish outwardly; antennae gray, with narrow paler annulations; head white, the tuft with a few fuscous hairs. Thorax brownish ochreous, with a white anterior transverse band passing on each side obliquely across the ends of the tegulae. Fore wings golden brownish ochreous; a broad median silvery white basal streak, broadening to the fold in a blunt angle on its under side, and margined all around with black scales; a short broad dorso-basal white streak, also black-margined, joins the median streak at base. Five costal and four dorsal silvery white spots. First costal spot, before the middle, quadrate, black-margined on both sides, its apex before that of the first dorsal. First dorsal quadrate, black-margined on both sides, its inner edge angled just below the apex of the median basal streak, its black margin produced along the middle of the wing and touching the apices of the broadly triangular second dorsal spot before the tornus and the narrower third dorsal spot beyond the tornus. A fourth dorsal spot just before apex is confluent with the third on the margin. Apices of second and third costal spots opposite apices of the corresponding dorsal spots. Apices of fourth and fifth costal and fourth dorsal spots meeting. A few black scales on outer side of fifth costal spot at apex. Cilia white. Hind wings pale silvery gray, with ochreous-tinged cilia. Legs white, fore and middle pair shaded with blackish fuscous, posterior tarsal segments black-tipped above. Expanse: 11 mm.

Type (♂) reared from a miner of manzanita, *Arctostaphylos manzanita*, Mt. Wilson, California. Mine found March 6, at which time the larva was full-grown; imago, March 30.

The mine is a grayish blotch, with the upper epidermis loosened and elevated, but at no stage wrinkled, producing a somewhat inflated mine in which most of the parenchyma is consumed. The larva belongs to the cylindrical group.

### *Lithocolletis inusitatella* n. sp.

Palpi pale golden; antennae with alternate annulations of whitish ochreous and fuscous; face pale golden; tuft brownish ochreous. Thorax and ground color of the fore wings lustrous golden; upon this ground color the position of faintly paler costal streaks and scarcely discernible dorsal streaks is marked by the darker more brownish shades which form their inner margins. A faintly paler shade begins on costa at base, broadening outwardly and is margined beneath by a faint brownish line which extends along the middle of the wing and joins in succession the very oblique inner margins of two faint pale golden costal streaks, the first starting at the middle of costa. There is thus along the middle of the

wing a more brownish golden shade. The third and fourth costal streaks are narrow, inwardly oblique, more nearly white, and opposite two similar streaks above the tornus, of which the first is often absent. Opposite the first oblique costal streak, a faintly paler shade sometimes indicates the position of a dorsal streak; just before tornus a darker shade marks the inner margin of a second dorsal streak. A small black apical spot. Scales at margin around apex bluish metallic. Opposite the apical spot, a brown pencil of scales projects the length of the cilia beyond them. Hind wings gray, with ochereous-tinged cilia. Legs silvery. Abdomen fuscous above, silvery beneath. Expanse: 8-11 mm.

Type ( $\delta$ ), and five paratypes (3  $\delta$ , 2  $\eta$ ), reared from large underside mines on oak, *Quercus agrifolia*, Mt. Wilson, California. Mines collected March 6, when the larvae had pupated; imagoes April 2 to April 13; the date of emergence of the type April 4.

The mine is 2 to 3 cm. long, 1 to 1.5 cm. wide, with two or three widely separated wrinkles at maturity; leaf little bent. Cocoon a loose meshwork attached to the upper epidermis.

#### ***Lithocolletis cretaceella* n. sp.**

Palpi, face and tuft white, sides of the tuft ochereous. Antennae white, with fuscous annulations; two broad widely separated rings near the tip. Thorax white, with a median transverse ochereous and black band. Fore wings white; a golden ochereous band, with a patch of black scales on costa and dorsum, crosses extreme base of wings; three curved ochereous streaks nearly reaching costa, near base, before middle, and beyond middle of dorsum, each margined inwardly by a line of black scales; the second and third of these are angulate near costa, the short arm of the third produced as a broad ochereous bar to costa. The apex of a narrow dorsal streak at tornus joins a patch of black dusting below apex. Marginal line of scales around apex ochereous; a single line of black scales begins on costa before apex and joins the patch of dusting. Cilia white; a tuft of ochereous scales opposite apex. Hind wings and cilia silvery, faintly ochereous. Legs white, with black and fuscous transverse and oblique bars; tarsi black-tipped. Abdomen white; paired brownish oblique streaks on the underside; four longitudinal streaks along the last three segments. Expanse: 10.5 mm.

Type ( $\eta$ ) reared from a blotch mine on the upper side of a leaf of oak, *Quercus hypoleuca*, White House Canyon, Santa Rita Mountains, Arizona.

The mine, found March 17, is a yellowish and brownish blotch, with a single wrinkle in the epidermis; the imago emerged April 12.

Although the general type of marking is that of *L. macrocarpella*, this species is very different from all other described species of the flat-larval group in the preponderance of white on the wings.

#### ***Lithocolletis arizonella* n. sp.**

Palpi and face white; tuft white, hairs on each side and in the middle reddish ochereous. Antennae white beneath, dotted with black above; darker toward tip. Thorax and fore wings reddish ochereous; two broad white stripes on the thorax; each stripe continuous with a white stripe which crosses from the base of the wing to the dorsal margin beyond the basal angle, thus leaving at the basal angle a small elongate spot of ground color. The dorso-basal white

stripe extends to the middle of the dorsum, whence it is deflected upward as a very oblique narrow white streak which meets at an acute angle a narrow oblique white costal streak; the angulated fascia thus formed is heavily black-margined before and at its angle. Before this fascia an oblique white costal streak, with black scales at its tip. A small spot on costa beyond the fascia, and beyond this an oblique white streak which meets in a V an inwardly oblique white streak preceding the dusted patch at the apex. An oblique outwardly black-margined streak at tornus. Cilia ocherous. Legs white, with reddish ocherous bars, tarsi black-tipped. Expanse: 8.5-9 m.

Type (♂) and four paratypes (2♂, 2♀) reared from upper-side mines on *Arbutus arizonica*, White House Canyon, Santa Rita Mountains, Arizona.

The mine is a broad tract, with loosened epidermis at first somewhat greenish, later brown. The larva pupates toward one end of the mine, where the epidermis is thrown into two short folds. The epidermis around the margins of an oval area, in which the pupa lies, is somewhat puckered. Mined leaves collected March 17; imagoes April 9 to April 22.

This species is separated from its allies of the *conglomeratella* group by the two white stripes of the thorax and the patch of ocherous ground color at the basal angle of the fore wing.

#### ***Acrocercops arbutella* n. sp.**

Labial and maxillary palpi white, second segment of each fuscous outwardly at base; antennae brownish ocherous; head white. Thorax white, tegulae ocherous. Fore wings shaded golden brownish ocherous, the deeper shades preceding the white spots. Three large, nearly half-oval white spots on the dorsal margin, the first narrowly extended to base, and an elongate white spot beyond the tornus. Costa before middle whitish, shading into the ground color below the margin; beyond middle, a curved white costal streak, its apex opposite the space between the second and third white dorsal spots, followed by a white streak not clearly defined. Beyond this a straight narrow white band passes obliquely across the wing, and parallel to it a straight broader band, both running into the white elongate spot beyond tornus. These two parallel white bands are cut by two parallel longitudinal fine black lines in the middle of the wing, the lower one margining the upper edge of the elongate white spot. Before the lower line, and in a line with it, is a shorter less distinct blackish or dark brown line. A triangular white streak crosses the ocherous costal cilia to the extreme apex of the wing; at the apex of the wing is a group of brown or black scales. A white band crosses the cilia at apex. Outer half of cilia below apex white. Hind wings pale gray, cilia ocherous in the basal half. Legs white, segments shaded with ocherous and tipped with black. Expanse: 11-12.5 mm.

Type (♂) and twenty-two paratypes (♂ and ♀) reared from large upper-side blotch mines on leaves of *Arbutus arizonica*, White House Canyon, Santa Rita Mountains, Arizona.

The loosened epidermis of the mine is very thin, whitish at first, later brownish; the parenchyma is either almost entirely consumed over about half the mine, or irregularly eaten over the whole mine. Cocoon broadly oval, reddish ocherous. Mines collected March 17; imagoes April 11 to April 18.

**Leucoptera robiniella n. sp.**

Head smooth, shining silvery white, thorax and fore wings shining white. Beyond middle of costa, an oblique yellowish bar, edged on both sides with dark fuscous, followed by a second perpendicular bar, also fuscous-edged; both of these bars terminate in a median longitudinal reddish coppery patch before apex. Below the second bar a large violet metallic patch beyond tornus, preceded and followed by large patches of black scales. Three diverging black lines in the apical cilia. Hind wings gray. Expanse: 5-6 mm.

Type (♂) and five paratypes (3♂, 2♀), reared from miners of leaves of *Robinia neo-mexicana*, Bright Angel Point, North Rim, Grand Canyon, Arizona, 8100 feet altitude.

The mine is a greenish, slightly irregular blotch, on the upper side of a leaflet; it begins as a very narrow linear mine abruptly enlarging into the blotch, which usually obliterates the linear mine. Cocoon of the usual *Leucoptera* type; in this case the flat silken bands are not as regular or as evenly spun as usual, and one is broader than the other, which is often merely a few strands of silk. These bands are not joined across to one another but each is joined to the inner cocoon by an inwardly sloping narrow band.

The larvae were collected July 26 and pupated soon after; imagoes April 3 to April 4.

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**NEW TACHINIDAE IN THE CANADIAN NATIONAL COLLECTION  
(DIPTERA)\***

BY C. H. CURRAN,  
Ottawa, Ont.

Most of the species described in the following pages belong to *Hypostena* as used by Coquillett in his revision of North American Tachinidae. While Townsend has established a number of genera, it is difficult to follow him, and the material before me indicates that these genera are too weakly differentiated to be recognized. I have therefore used the name *Hypostena*, even though Coquillett later considered that *Tachinophyto* should more properly be used for our North American species.

***Hypostena (Arrhinomyia) ouelleti* new species.**

Allied to *H. barbata* but differs in the length and strength of the frontal bristles, bristly facial ridges on lower half, narrower front, more slender form, etc.

Length, 5 mm. *Male*.—Head silvery white pollinose, the upper fourth of the front with brownish yellow pollen, one long slender bristle among the long hairs on the cheeks. Vibrissae on level with oral margin. Facial ridges with bristles of almost equal length on lower half to three-fifths; face on lower portion about as wide as eye, with low median carina on whole length. Front hardly one-fifth head width, the frontal bristles long but not strong, not strengthened above but of almost equal length, the upper two (sometimes a weak bristle

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\*—Contribution from the Division of Systematic Entomology, Entomological Branch, Dept. of Agric., Ottawa.



between them) reclinate, the others cruciate, but two situated slightly outside the frontal rows proclinate, these sometimes better differentiated and more evidently distinguished as orbitals. Parafrontals hardly as wide as the brown median vitta. Ocellars fairly long and fine. Palpi brown, antennae black, reaching the mouth edge; third joint of moderate width, rounded at apex below, truncate above, three times as long as second joint. Arista long, thickened on basal third, microscopically pubescent.

Thorax grey pollinose, the mesonotum with brownish pollen except the humeri, lateral margin in front of wings, a broad fascia immediately before the suture divided by three moderately broad dark vittae on median fourth. Post. dscr. 3, long and fine; Post. acr. 3, long and very fine, stpl., 3, the lower one sometimes barely distinguishable among the long hairs. Scutellum with three pairs of marginals, the apical pair absent.

Legs black; antero-dorsal row of bristles on front tibiae hardly evident, the posterior bristles at middle and apical fourth strong. Middle tibiae with one strong anterior bristle and somewhat weaker bristles posterodorsally on basal and apical third. Posterior tibiae with strong antero-dorsal bristle at middle and postero-dorsal a little beyond the middle, a postero-ventral bristle at middle and one at apical fourth; also with several smaller bristles on antero and postero-dorsal surfaces.

Wings lightly infuscated especially antero-basally, the veins all brown; ultimate section of fourth vein about as long as penultimate section; discal crossvein straight, slightly oblique. Third vein with one basal bristle. No costal spine.

Abdomen shining black, the basal fourth of second to fourth segments greyish white pollinose, the remainder of the abdomen thinly brownish pollinose in some lights.

Bristles of abdomen long and fine; first segment with marginals, second with one pair of discals and marginals, third with a row of discals and marginals, the median pair strong, fourth segment with median and apical rows of bristles. Posterior forceps with strong bunch of hair at base.

*Holotype*—♂, Joliette, Quebec, July 9, (Br. Joseph Ouellet), No. 1307 in the Canadian National Collection.

*Paratypes*—Male, same data as type: male, Covey Hill, Que., Aug. 13, 1924, (T. Armstrong); male, Aweme, Man., June 3, 1920, (N. Criddle).

### ***Hypostena vexans* new species.**

Allied to *barbata* but lacks the tuft of hairs on the posterior forceps, costal spine well developed.

Length 5.5 mm. *Male*. Front one-seventh head width, the black frontal vitta narrowed above so that it is not wider than parafrontal in front of ocelli, distinctly wider below. Head grey pollinose, the face with whitish reflection. Vibrissae on level with oral margin, five or six bristles above them, the first two almost half as long as the vibrissae, all the bristles on the lower fifth; median carina low, obsolete below; parafacials narrow, a little widened above. Frontal bristles reaching base of third antennal joint, moderately strong, the three upper ones reclinate, the ocellars long, slender. Palpi black, antennae black, not reach-

ing the vibrissae, third joint narrow, twice as long as second joint. Arista slender, thickened on basal fifth, microscopically pubescent.

Thorax greyish pollinose, the mesonotum with brownish pollen except on the humeri and large lateral triangles before the suture. Post dscr. 3; post. acr. 3 strong; stpl. 2:1. Scutellum with three pairs of strong marginals and weak, divaricate apical bristles.

Legs black. Front tibiae with a strong posterior bristle on apical third, reaching to apex of tibia; in front with only three or four weak antero-dorsals on basal half. Middle tibiae missing. Hind tibiae with a row of antero-dorsal bristles, one at basal and apical third strong; on the postero-dorsal surface with four rather strong bristles between the basal fourth and middle; a strong antero-ventral bristle near apical third, one weaker one before it. Claws and pulvilli large.

Wings, strongly infuscated, paler behind and apically. Apical cell closed in wing margin; discal crossvein oblique, sinuous. Squamae pale yellowish, the lower lobe tinged with brown except at base. Halteres orange.

Abdomen shining black, about the basal fourth of the second to fourth segments greyish white pollinose, the pale fasciae interrupted at the middle. Bristles of abdomen as in *ouelleti*.

*Holotype*—Male, Barrington Passage, N.S., June 24, 1910 (C. H. Young). No. 1308 in the Canadian National Collection.

#### ***Hypostena (Arrhinomyia) tothilli* new species.**

Allied to *Hypostena luctuosa* Mg. from which it differs in the wider face, slightly weaker bristles on facial ridges, shorter hair on base of posterior forceps and greyish white pollinose abdominal fasciae. A specimen determined by Dr. M. Bezzi as *Arrhinomyia luctuosa* Mg., is before me. In the catalogue of Palaearctic Diptera this species is placed in *Degreeria* which is included in the *Dexiinae*. Although *Hypostena barbata* Coq. has not the bristly facial ridges it agrees in all other characters with *Arrhinomyia* and is undoubtedly congeneric.

Length, 6.25 mm. *Male*. Head silvery pollinose, the frontal vitta black, much wider than the parafrontals on which the pollen is not as dense as on face; back of head grey pollinose. Vibrissae on level with oral margin, about four bristles above them, the lower three-fifths of facial ridges with bristly hairs; parafacials very narrow below, twice as wide above; face strongly widened below. Frontal bristles strongly divergent below, reaching below base of arista, the lower six and upper three reclinate; ocellars long, slender. Palpi brown, the tip obscurely reddish. Antennae black, third joint broad, four times as long as second, sub-truncate, arista slender, long, thickened on basal fourth microscopically pubescent; width of cheeks equal to almost twice the length of second antennal joint.

Thorax greyish pollinose, the mesonotum thinly so and with four broad bare vittae. Post dscr. 3; post acr. 3, the anterior pair very weak; stpl. 2:1 strong. Scutellum with three pairs of strong marginals, the apical bristles very small, hair-like.

Legs black. Anterior tibiae with a row of short antero-dorsal bristles on basal two-thirds, behind with a bristle at middle and at apical fourth, middle legs missing; posterior tibiae missing.

Wings tinged with luteous especially at base in front; last section of fourth vein longer than penultimate section; discal crossvein joining apical cell at apical two-fifths of posterior edge; first, third and fifth veins brown, the others luteous. Third vein with two or three basal bristles. Squamae white, the lower lobe broadly lightly pale luteous. Halteres reddish.

Abdomen shining black; basal third of second, basal fourth of third and basal fifth of fourth segment whitish grey pollinose. First and second segment with a pair of strong pre-marginals, the second with one pair of strong discals before the middle and pair of widely spaced long fine marginals; third and fourth segments each with pre-apical row of bristles, the latter with discal row before the middle, the third with one pair of strong discals. Hairs of middle of dorsum bristle-like, fairly long, erect, sparse. Posterior forceps long, slender, not strongly tapering, split on apical third.

*Holotype*—Male, Fredericton, N.B., July 17, 1912, (J. D. Tothill), No. 1309 in the Canadian National Collection.

#### ***Hypostena columbia* new species.**

Apical cell rather long petiolate; facial ridges bristly on lower three-fourths; abdominal segments very narrowly white pollinose at base; front of male without orbitals.

Length, 4.5 to 5 mm. *Male*. Wholly shining black. Front slightly over one-third head width, one-third wider than either eye, the orbits divergent to lower edge of eyes, the face very wide; head silvery white pollinose, front almost bare, frontal vitta blackish; frontal bristles about seven in each row, rather strongly diverging above and below and situated well away from the inner edge of parafrontals which bear a number of longish bristly hairs; upper two frontals reclinate, the anterior one strongest, outer verticals divergent. Parafacial bristles strong. Facial depression with well-marked carina on whole length. Back of head with white hair below except toward the margins. Palpi brown. Antennae reaching oral margin, third joint very wide, four and one-half times as long as the second; arista thick, suddenly constricted at the middle, the microscopic pubescence on apical half very short.

Thorax moderately grey pollinose, the mesonotum thinly so, with four wide bare vittae in some views. Post acr. 3.; post descr., 3; stpl. 3, in almost equilateral triangle. Scutellum with three pairs of strong marginals, the apical pair parallel; above and between the apical pair with a pair of smaller upwardly directed bristles.

Legs black. Anterior tibiae with a single posterior bristle near the middle, another at apical third. Middle tibiae with a strong antero-dorsal bristle beyond the middle and a small one at the middle and on the postero-dorsal surface with a bristle at middle and beyond apical third; below with a strong bristle; the anterior and posterior bristles reach the apex of the tibia. Hind tibiae sub-ciliate with strong bristles on postero-dorsal surface and a row of four on antero-dorsal surface terminating in strong bristle at apical third; two ventral bristles. Claws and pulvilli large, the latter yellow.

Wings cinereous hyaline, yellowish at immediate base. Third vein with two bristles at base. Squamae white. Halteres black, the stem largely reddish.

Abdomen shining, immediate base of second to fourth segments white pollinose, the venter with more yellowish pollen over most of surface. First segment without bristles, the second and third each with a pair of strong discals, the second with one pair of median marginals, third with the median pair of marginals rather remote from margin, the other pairs near the margin, fourth segment with a row of strong bristles at basal and apical third, the apical row not developed.

*Holotype*—Male, Eburne, B. C., June 3, 1915, (R. S. Sherman), No. 1310 in the Canadian National Collection.

*Paratype*—Male, Penticton, B. C., June 22, 1919, (E. R. Buckell).

The hind femora bear two very long slender bristles on ventral surface at basal fifth and basal two-fifths.

#### ***Hypostena imitator* new species.**

Agrees with *H. columbia*: Differs as follows:

Length, 5 mm. *Male*. Pulvilli and claws noticeably smaller; apical cross-vein not quite as long and hardly as oblique. Abdomen wholly destitute of pollen above, the brown pollen on the venter obscure; fourth segment with three rather irregular rows of discals, the apicals not developed. Postero-dorsal surface of anterior tibiae with a row of five bristles on basal two-thirds; strong antero-dorsal bristle on middle tibiae situated a little before the middle, not nearly reaching apex of tibia, the bristle preceding it fairly strong.

*Holotype*—Male, Lillooet, B. C., June 15, 1917, (J. D. Tothill) No. 1311 in the Canadian National Collection.

#### ***Hypostena alberta* new species.**

Allied to *H. variabilis* Coq. but the front is only two-ninths the head width or three-fifths that of either eye.

Length 6 mm. *Male*. Agrees with *H. variabilis* except as follows; front one and one-fifth as long and more raised and narrower. Eyes flatter, the facets decidedly more enlarged. Scutellum entirely devoid of apical cruciate bristles. All the abdominal segments are pollinose except on the apical fourth and median dorsal vitta, the pollen above greyish yellow with brassy reflection, below greyish

*Holotype*—Male, Slave Lake, Alta., July 2, 1924, (Owen Bryant) No. 1303 in the Canadian National Collection.

#### ***Hypostena impatiens* new species.**

Near *H. variabilis* Coq. but the deep brassy yellow pollen on thorax and abdomen appears brownish from dorsal or anterior view while in *variabilis* the pollen does not change colour except from anterior view and it is much more dense.

Length, 4.5 mm. *Male*.—Front not quite as wide as either eye (in *variabilis* hardly two-fifths as wide as eye), from posterior view deep golden yellow pollinose, the frontal vitta, wide, black, the parafrontals yellowish brown from dorsal view; frontal bristles strongly divergent below, the two upper and vertical reclinate, the outer vertical and orbital cilia strong; a single weak orbital opposite the upper cruciate frontal, the hairs on the parafrontals moderate in length and thickness. Occiput and face silvery grey pollinose, the posterior orbits yellowish above. Median depression with low obscure carina on whole



length; facial ridges bristly on lowest fourth. Palpi reddish. Antennae black; third joint large, broad, five times as long as the short second; antennae reaching quite to the oral margin; arista thickened on basal third, microscopically pubescent.

Thorax rather thickly grey pollinose, with strong brassy tinge, especially on the mesonotum which has four bare shining black vittae. Postsutural dscr. and acr., 3; sternopleurals, 2:1. Scutellum with three pairs of strong marginals and a small apical pair of cruciate bristles.

Claws and the fuscous pulvilli short, hardly over half as long as in *variabilis*.

Wings cinereous hyaline; yellowish at base; third vein with three basal bristles. Squamae white, the lower lobe brownish yellow except at base. Halteres yellow.

Abdomen black; second to fourth segments greyish yellow pollinose with strong brassy reflection in some views, the apical fourth and median vitta shining black. First and second segments each with a pair of strong discals, the third and fourth with a row of marginals, the latter with a row of discals on apical third and a few scattered ones beyond the middle; hair sparse but fairly long.

*Holotype*—Male, Teulon, Man., Aug. 4, 1922 (A. J. Hunter), No. 1312 in Canadian National Collection.

#### ***Frontina malacosomae* new species.**

Close to *F. frenchi* Willist. but smaller and the posterior forceps only two-thirds as long, wider, the groove broader and more extensive.

Length, 6 to 7 mm. *Male*. Front slightly over one-fourth head width. Head greyish pollinose, the face above with slight, the front with strong, brassy dark yellow tinge. Vibrissae strong, level with oral margin, facial ridges with strong bristles on lower three-fourths; frontal bristles divergent below, extending almost to the upper facial bristles, in a single row, becoming weaker above, the upper two stronger and reclinate, separated from the frontal row; two or three rows or irregular rows of short bristly hairs outside the frontals. Ocellars strong. Palpi reddish. Antennae black, reaching lower sixth of face; third joint six times as long as short second, broad, the apex angular above, rounded below, arista thickened on basal half; eyes sparsely hairy.

Thorax grey pollinose, with four or five rather narrow dark vittae on mesonotum. Post. dscr. 4; post acr. 3; sternopleurals 4. Three pairs marginal scutellars and weak, upwardly directed cruciate apical pair.

Legs black, tips of femora reddish. Anterior and middle tibiae with two posterior bristles, the middle pair with a single long anterior with two weak bristles preceding it and a strong ventral. Posterior tibiae with a row of even, antero-dorsal cilia, one at the apical third stronger, and a row of increasingly stronger postero-dorsal bristles on basal two-thirds. Pulvilli large, brownish yellow.

Wings greyish hyaline; apical cell open, its apex only moderately before the wing tip; discal crossvein gently sinuous, oblique, joining fourth vein well beyond middle of its penultimate sector.

Abdomen black, with large orange spot on either side of the second segment, greyish pollinose, the median vitta and obscure apical segmental fasciae bare or brownish pollinose. First segment with weak marginals, second with pair

of strong marginals, third with row of marginals, the fourth segment with pre-apical row of strong bristles and a weaker apical row, the hairs on the disc of each segment and on the fourth segment rather bristly and fairly long, sometimes quite bristle-like along middle line.

*Female*—Front one-third the head width; two orbital bristles; third antennal joint reddish at base. Egg guide not strong. Otherwise as in male.

*Holotype* and *allotype*—♂, ♀, Truro, N. S. July 18, 1914, (W. H. Brittain) No. 1306 in the Canadian National Collection: from American Tent Caterpillar.

*Paratypes*—3 males same data.

The above description applies well to *F. frenchi* except for the genitalia. *F. frenchi* also has a row of stronger, bristly hairs next to the frontal rows and the frontal hairs are longer. My reared specimens of *frenchi* are from *Cecropia* larvae. *F. malacosomae* closely resembles a small *frenchi*.

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### BUCKELLIA, A NEW GENUS OF ASILIDAE (DIPTERA).\*

BY C. HOWARD CURRAN,

Ottawa, Ont.

This genus is proposed for the reception of *Cophura albosetosa* Hine, (*cyrtopogona* Cole). The genus *Cophura* has been used as a repository for all species having a curved spur at the tip of the anterior tibiae which do not fit into any other genus.

*Cophura* (Genotype, *sodales* O. S.) must be limited to those species which have the face practically flat, strong bristles on the oral margin and at most a few fine hairs on the face, abdomen flattened, with rather parallel sides.

*Buckellia* has the face evenly gently convex, but slightly more retreating below and possesses a fairly strong twisted apical spur on the front tibia, the abdomen is tapering as in *Cyrtopogon* and the genotype has a sericeous or greyish pollinose spot on the posterior angles of the second to sixth segments. I have a pair of *B. albosetosa*, in coitu, collected on Revelstoke Mountain, B. C., by Mr. E. R. Buckell.

*Cophura* O. S. is most closely allied to *Nicocles* Jaenn., while *Buckellia* is related to *Cyrtopogon* Lw., being nearest *Comantella* Curran and closely resembling those species of *Cyrtopogon* having the scutellum flattened and pollinose.

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\*—Contribution from the Division of Systematic Entomology, Entomological Branch, Dept. of Agric., Ottawa.

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The Dominion Entomologist announces the following promotions in the Entomological Branch of the Dominion Department of Agriculture.

Allan G. Dustan from Assistant Entomologist to Entomologist.

C. R. Twinn, from Junior Entomologist to Assistant Entomologist.

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